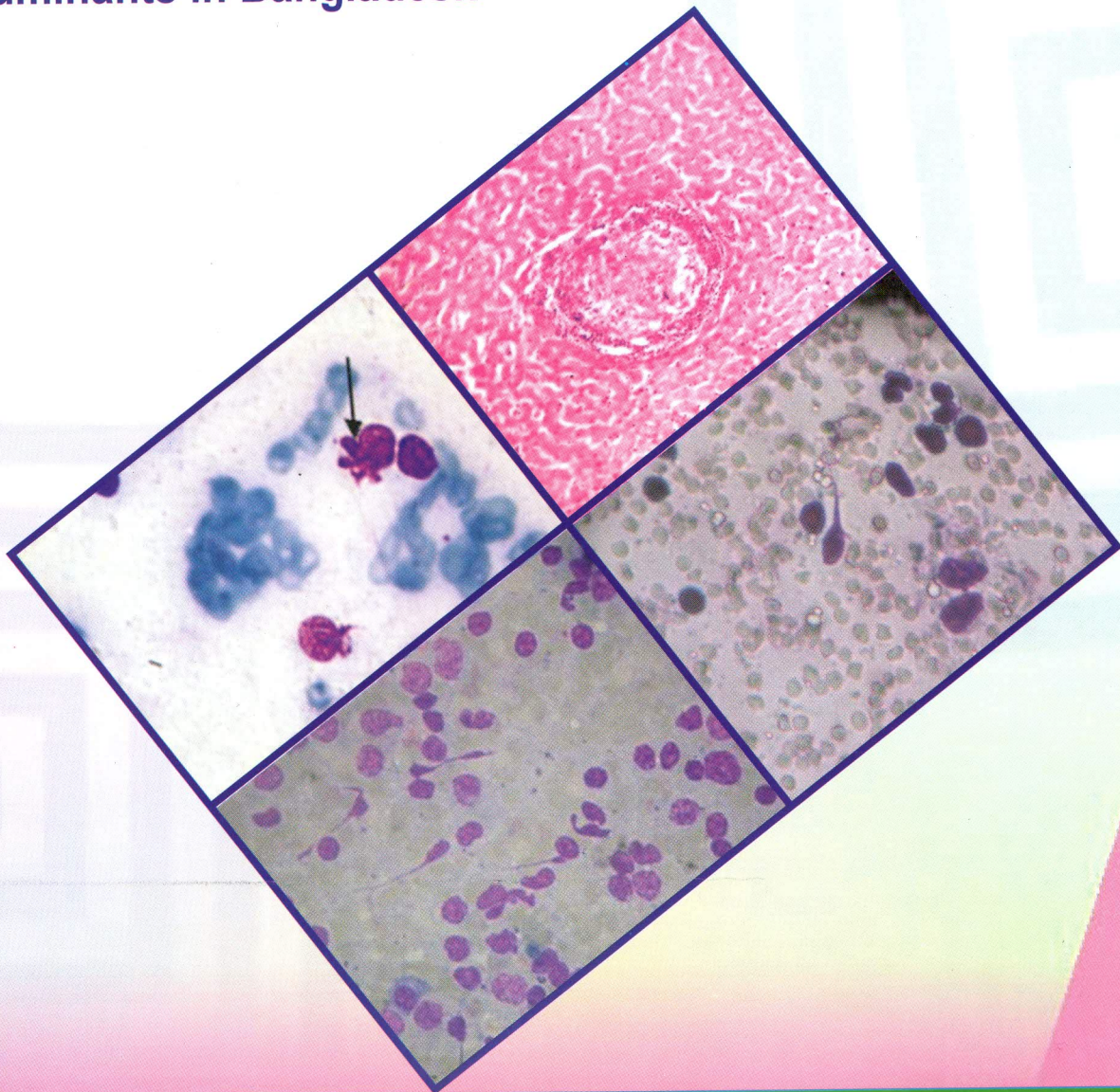


## Project Title :

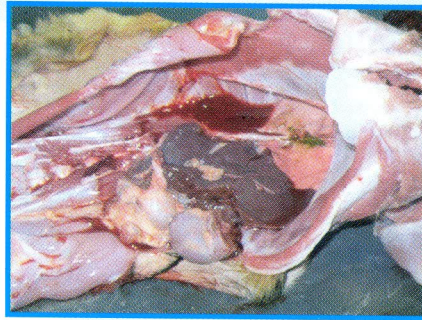
A Co-ordinated project onto the surveillance of important infectious, zoonotic and emerging diseases of livestock and poultry

## Running title:

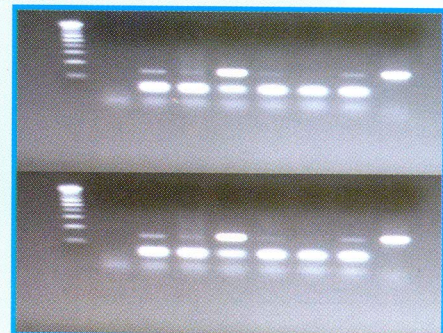
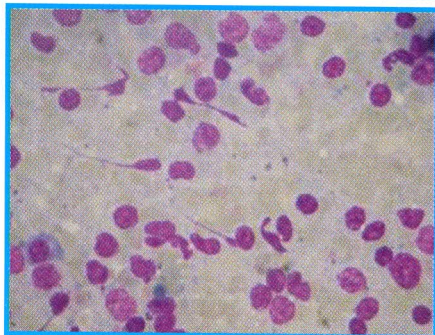
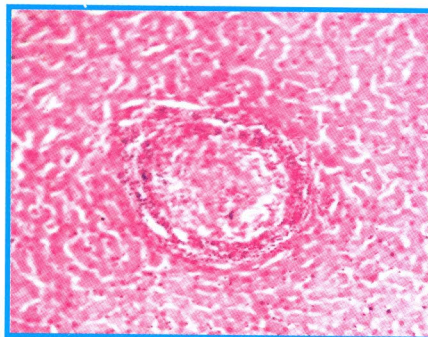
In search of identifying infectious causes of animal mortality; Foot and Mouth Disease (FMD) and *Peste Des Petits Ruminants* (PPR) are the important killer of ruminants in Bangladesh







Cow (left) and goat (right) collected from Phulbaria Upozilla, suspected to infect with Visceral leishmaniasis, where the house holds were infected. A detail necropsy (bottom) was performed to investigate the presence of leishmanial infection in animals



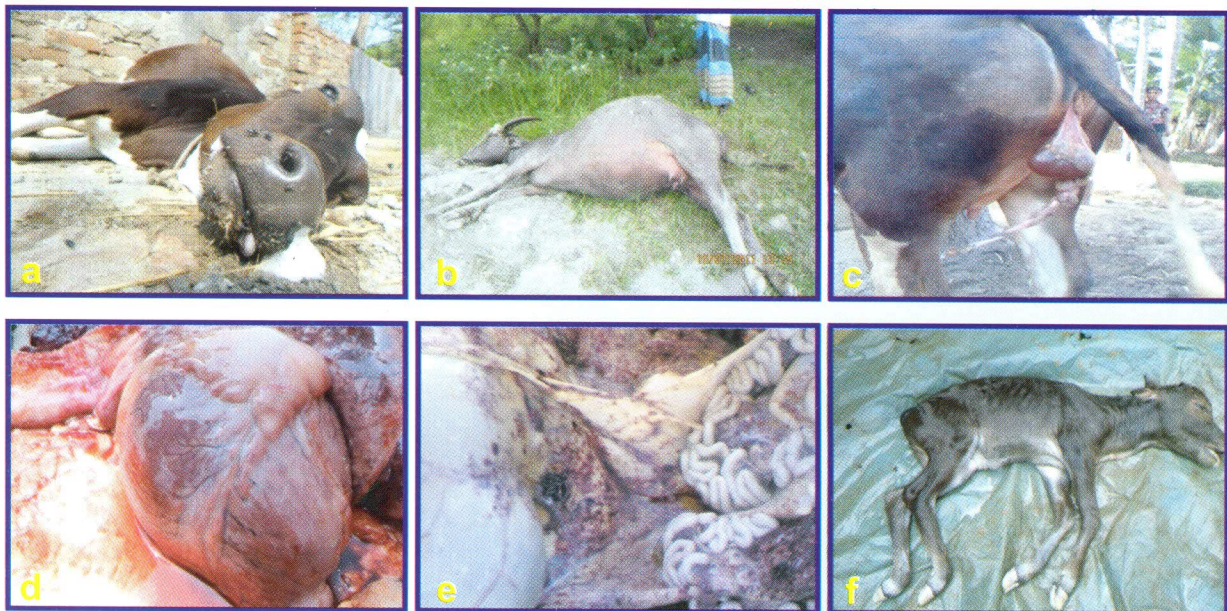
Microscopically characteristics nodular lesion (top) was seen consisting of closely packed collection of macrophages and lymphocytes in the liver of reservoir animals (H & E Staining, 400x). Leishmanial protozoa were seen in the impression smears prepared from spleen (left, 400x). *Leishmania donovani* (Kal-azar) specific primers was used in PCR amplification and generation of 145bp amplicon (right) selective for VL



# In search of identifying infectious causes of animal mortality; Foot and Mouth Disease (FMD) and *Peste Des Petits Ruminants* (PPR) are the important killer of ruminants in Bangladesh

## Background of this study

Livestock has been an integral component of traditional agriculture in Bangladesh and cattle, buffaloes, goats, and poultry are playing pivotal role in agricultural operations in terms of producing milk, meat, eggs, hides and draft power. There are about 23.4 millions cattle, 8 millions Buffaloes, 30.33 million goats, 2.78 millions sheep, and 222 millions poultry in Bangladesh. There is uncountable mortality of livestock and poultry in Bangladesh each year and the reasons of the mortality in most of the cases remain unknown. This study was, therefore, aimed to identify most notable infectious diseases of livestock and poultry and developed possible strategies to prevent their dissemination.

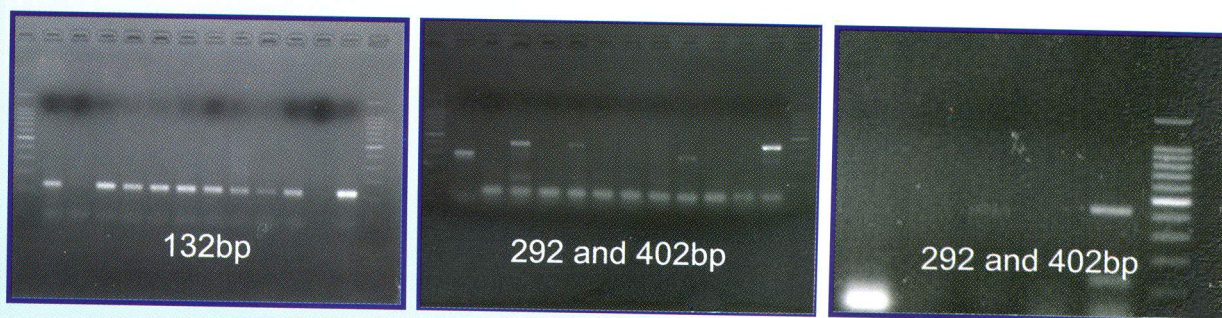


Foot and Mouth Diseases (FMD) found number one calf killer (left, **a** and **d**) in Bangladesh and the calf died due to heart failure. Anthrax in animal is always fatal and the animal died due to massive internal haemorrhages (middle, **b** and **e**). Brucella is not fatal in large animal but there is late abortion in pregnant cow, delivered weak/ dead foetus (right, **f**) and there is retained placenta (**c**)



## Approaches and methodologies

In this study 2000 suspected/ sick animals were examined and 742 samples were collected from Dhaka, Netrokona, Tangail, Coxes bazar, Feni, Jessore, Borguna, Rangpur, and Kurigram. The collected samples constituted were 276 for suspected cases of FMD, 57 for Tuberculosis (645 animals were tested with Tuberculin), 63 for Leishmaniasis (13 golden jackals, 5 dogs, 25 goats and 20 cattle), 12 for anthrax, 79 for Avian Influenza, 180 for brucellosis, 25 for diseases of ducks in Haor areas of Netrokona district and more than 50 cases of unknown etiology. The collected samples were analyzed in the Department of Pathology, Bangladesh Agricultural University and tested by Histopathology, Polymerase Chain Reaction (PCR), Reverse Transcriptase Polymerase Chain Reaction (RT-PCR), Enzyme Linked Immunosorbent Assay (ELISA), Special staining, Serology and Necropsy. 10 known positive samples of FMDV (eight Serotype 'O' and two Serotype 'Asia-1') and nine samples positive to human and bovine Tuberculosis (TB) were sequenced. Leishmanial (Kal-azar) DNAs were identified from cattle, goats, dogs and jackals using PCR. Adopt PCR protocol for the detection of Babesiosis, Thileriosis, Pasteurellosis and Brucellosis. The epidemic duck mortality in the haor areas was investigated by cultural, biochemical and PCR means. Data based surveillance of animal diseases is in progress and information on animal diseases and preventive measures against them will be available at [www.hadivetpath.com](http://www.hadivetpath.com)



Single step RT-PCR detection of FMD viral RNA from the suspected field cases. The RT-PCR products were electrophoresed in 1.5% agarose gel, images captured and amplicon of 132bp and 292bp size were confirmatory for Serotype 'O' and 402bp for Serotype 'Asia 1' of FMD viruses



## Achievements

- In most of the geographic location of Bangladesh the Serotype "O" FMD viruses are prevailing and vaccination of animals against FMD Serotype 'O' need to be expanded.
- Intradermal Tuberculin test (N = 656), Acid fast staining, Culture on Lowenstein-Jensen medium and PCR technique successfully detected Tuberculosis in 21 (3.2%) dairy cattle. The Holstein-Friesian Cross breed cattle were more susceptible to tuberculous infection (65%) compared to other cross breed animals. Both Human and Bovine Tuberculosis are existing in the dairy cattle.
- PPR is endemic in Bangladesh, the common signs were Diarrhoea, Discharges from the nostrils and Death (60-70% mortality). About 25-35 goats were died due to PPR in each village of Bangladesh around the year. The vaccine currently used is 50-60% protective.
- The PCR protocol we adopt successfully detected Visceral leishmaniasis (Kal-Azor) in Cattle, Goats, Dogs and Jackals at Phulbaria, Haluaghat and Trishal Upozilla of Mymensingh district. These animals were proven as symptomless Reservoir of Kal-Azor.



Tuberculosis affected Dairy cattle (a) and typical cream color nodule as seen at time of biopsy in the Lymphnode (b) of affected cow. The Mycobacterium were grown on Lowenstein-Jensen media (c) and result of PCR (600bp product, (d) showed the presence of Bovine TB



## Lesson learned

Serotype "O" of FMD in cattle was found all over the country and Serotype "Asia 1" detected mostly in dairy cattle at Teknaf, Sylhet sadar upazilla, Savar Military Farm, Feni and Jhikargacha (Jessore). Human and Bovine Tuberculosis are prevailing in the government and public dairy farms in Bangladesh. The causal agent of Visceral leishmaniasis (*Leishmania donavani*) is present in cattle, goats, dogs and jackles in the endemic areas and these animals are acting as symptomless reservoir of the diseases. It needs extensive programme to eradicate mosquitoes including sand flies from the endemic areas in order to prevent dissemination of VL. The anthrax vaccine is found to induce IgG antibody response in cattle. Goat died in the villages, examined at necropsy and results of laboratory testes suggested that about 60 - 70% goat died in village condition is due to PPR and Pasteurellosis in a common secondary invader. *Pasteurella anatipestifer* is common in the duckling of haor area of Netrokona district.

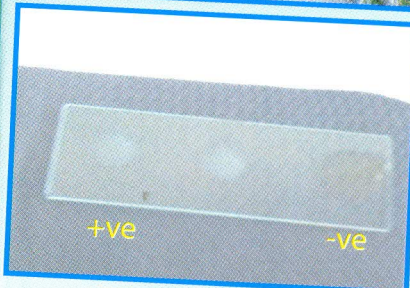
## Success story

The molecular (PCR, RT-PCR, ELISA) test protocols we adopt successfully detect serotypes of FMD viruses, Anthrax, Tuberculosis in man and animals, Leishmaniasis in man and animals, Avian influenza in birds, Duck anatepestifer infection in ducks, diseases of jackles and dogs, Thileriosis and Babesiosis in cattle, PPR in goats etc. We can now detect a number of deadly infectious, zoonotic and emerging diseases of livestock and poultry within shortest period of time.

Four MS in Pathology student have successfully completed their Thesis work under the project head and two PhD student have been working towards achieving their dissertation proposal.

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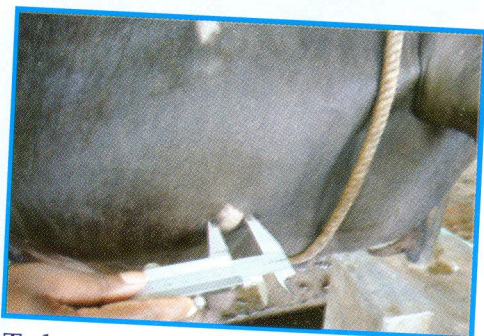




Identification of Anthrax from dead animals (upper left). At necropsy there was profuse hemorrhages and consolidation of lungs (upper middle). The bacteria was found to grow on Blood agar media (upper right), agglutinate with the known positive sera (lower left) and agglutinated bacteria appeared garland shaped under microscopic field (lower middle). The bacteria arranged in chain and stained blue (lower right, 1000x) while stained with Gram's staining



Tuberculin Test of Cattle. The skin swelling at caudal fold was measured by Slidecaliper



Tuberculin Test of Cattle. The skin swelling of neck region was measured by Slidecaliper



Tuberculin gun



Bovine and Avian PPD (Tuberculin) in vials





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**For further details, please contact**

**Dr. Md. Abu Hadi Noor Ali Khan**

**Principal Investigator**

**and**

**Professor, Department of Pathology**

**Faculty of Veterinary Science**

**Bangladesh Agricultural University**

**Sub-Project**

**Department of Pathology**

**Bangladesh Agricultural University**

**Mymensingh-2202, Bangladesh**

**Tel. +880 (0)1727203934, Web. [www.hadivetpath.com](http://www.hadivetpath.com)**

**Email. [hadikhan68@yahoo.co.uk](mailto:hadikhan68@yahoo.co.uk)**